IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Choi, et al.	Art Unit	: 1732
Serial No.	: 09/934,248	Examiner	: Mathieu D. Vargot
Filed	: August 21, 2001	Conf. No.	: 6502
Title	: FLEXURE BASED MACRO MOTION TRANSLATION STAGE		

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SUPPLEMENTAL APPEAL BRIEF

In response to the Advisory Action, dated September 4, 2007, Examiner Vargot stated in a voice message that the Summary filed on June 19, 2007 would be satisfactory in a Supplemental Appeal Brief.

I. REAL PARTY-IN-INTEREST

The real party in interest is The Board of Regents, The University of Texas System, who is the assignee of the entire right and interest in the present Application.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellants, the Appellants' legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-3, 5-6, 8, 11-16, 31-32, 35, 37-42, 45-49, 212-221 and 223-225 are pending in the Application.

Claims 4, 7, 9-10, 17-30, 33-34, 36, 43-44, 50-211, 222 and 226 have been cancelled.

IV. STATUS OF AMENDMENTS

There were no amendments to the claims or Specification filed after the Final Rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 recites an apparatus for positioning of an object 1801 in at least one plane comprising a holding member configured to hold the object to be positioned, and a positioning system including a linkage 1805 coupled to the holding member, defining a first joint 1807 thereat, with said first joint being coupled to a second joint through a plurality of elongated members and a flexure joint, with said plurality of elongated members being coupled to said flexure joint to move at substantially the same rate and in opposite directions to facilitate movement of said holding member along first and second axes, with the first axis extending transversely to the second axis. See Fig. 18; Specification, p. 30, line 26 – p.31, line 11.

Claim 31 recites an apparatus for positioning of an object along a first axis and a second axis comprising a holding member configured to hold the object to be positioned, a platform coupled to the holding member, a first set of flexure linkages coupled to the platform, defining a plurality of first joints thereat, with each of said first joints being coupled to a second joint through a first pair of elongated members and a first flexure joint so as to facilitate movement of said first pair of elongated members in opposing directions while facilitating movement of said platform along a first axis, a second set of flexure linkages coupled to the platform, said second set of flexure linkages defining a plurality of third joints thereat, with each of said third joints being coupled to a fourth joint through a second pair of elongated members and a second flexure joint so as to facilitate movement of said second pair of elongated members in opposing directions while facilitating movement of said platform along a second axis; a first motive device coupled to the holding member, wherein the first motive device is configured to move the holding member in relation to the platform

along said first axis, and a second motive device coupled to the platform, wherein the second motive device is configured to move the platform along said second axis. See Figs. 16-17; Specification, p. 29, line 21 - p. 30, line 19.

Claim 212 recites an apparatus for positioning of an object in a plane, said apparatus comprising a holding member retaining said object, a linkage coupled to the holding member, defining a first joint thereat, with said first joint being coupled to ground through a plurality of elongated members and a flexure joint, and a motive device coupled to the holding member for moving the holding member, with said plurality of elongated members being coupled to said flexure joint to move in opposite directions to facilitate movement of said holding member along an axis in response to movement of said holding member by said motive device. See, Fig. 19; Specification, p. 31, line 13 - line 27.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-3, 5-6, 8, 11-16, 31-32, 35, 37-42, 45-49, 212-221 and 223-225 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Scire et al.* (U.S. Patent No. 4,559,717) in view of the article to *Hogan* "Impedance Control: An Approach To Manipulation."

VII. ARGUMENTS

Applicants traverse the rejections of the claims as being unpatentable over *Scire* in view of *Hogan*. The Examiner has cited *Scire* as being applied previously in the Office Action having a mailing date of July 13, 2005. The Examiner has specifically stated that *Hogan* has been found and applied to make up for the deficiencies of *Scire*. The Examiner then admits that *Scire* lacks the holder and ground joints being coupled together with a plurality of elongated members and a flexure joint. The Examiner further admits that *Scire* fails to disclose the elongated members moving at substantially the same rate and in opposite directions to facilitate movement of the holding member along first and second axes. The Examiner then

goes on to assert that *Hogan* discloses such features in FIGS. 2 and 3 of the *Hogan* article. Applicants respectfully traverse.

Applicants do admit that in the embodiment shown in FIGS. 2 and 3 of *Hogan*, one end of the sets of linkages is coupled to a ground joint, while the other could be coupled to a holder. However, the *Hogan* article is merely referring to the relative motions of linkages, and does not in any way teach or discuss flexure joints, which are defined within the present application in paragraph [0141]. In fact, the combination of *Hogan* and *Scire* fails to in any way address such flexure joints.

In fact, Applicants do not know how the Examiner can combine the teachings of *Hogan* with the teachings of *Scire* to arrive at the claimed invention. *Scire* provides a holding member 40 that is limited to minute movement in only the x and y axes using the members 14-17 and 41-44. The entire device 12 as shown in FIG. 2 of *Scire* is made from a block of metal that has very limited ability to move except for within these minute x and y directions. In contrast, *Hogan* describes linkages or arms linked together for providing significant displacements in various directions with these linkages essentially hinged to each other. Such hinges provide rotational movement between the respective linkages at a hinge, while such significant rotational movement is not permitted within the *Scire* devices.

Moveover, one skilled in the art at the time the invention was made would not have combined the teachings of *Hogan* with the teachings of *Scire*, since the linkages in *Hogan* are individually manufactured and then hinged together, while the *Scire* linkages are manufactured as a result of machining of grooves and holes in a solid block of metal. To be blunt, the linkages in *Hogan* in no way can be combined with the devices described in *Scire*. These two teachings are totally incompatible.

Further, even merely the combination of the teachings of *Scire* and *Hogan* would not lead to the invention as presently claimed. One skilled in the art would not look at these two references, and arrive at what is being claimed in the present invention, as will be more further described below.

Claim 1 recites a holding member configured to hold an object to be positioned. The closest item within *Scire* and *Hogan* to such a limitation would be

the platform 40 in FIG. 2 of *Scire*. However, the combination of the two references does not provide for a first joint being coupled to a second joint through a plurality of elongated members in a flexure joint. Neither does the combination teach or suggest that the plurality of elongated members are coupled to the flexure joint to move at substantially the same rate in an opposite direction to facilitate movement of the holding member and axes. The holding member 40 in FIG. 2 of *Scire* may move along first and second axes, but there is no flexure joint that is coupled to a plurality of elongated members with elongated members moving at substantially the same rate in opposite directions to facility such a movement of the holding member 40. As FIG. 3 in *Hogan* may provide a first joint being coupled to a second joint through a plurality of elongated members, there is no flexure joint described in *Hogan*, and such joints and elongated members would not be physically combinable with the systems described in *Scire*.

Claim 2 recites that the plurality of elongated members consist of a pair of elongated members. In response, the Examiner has not in any way addressed such claim limitation.

Claim 3 recites wherein each of the plurality of elongated members is subjected to a pre-load. The Examiner has not in any way addressed this claim limitation.

Claim 5 recites that the plurality of elongated members consist of a pair of elongated members coupled to the flexure contact joint to allow rotation between the pair of elongated members through a predetermined range of motion. The Examiner has not specifically addressed this claim limitation at all.

Claim 6 recites that the plurality of elongated members comprises a pair of elongated members coupled to the flexure joint to allow rotation between the pair of elongated members through at least a 40 degree range of motion. The Examiner has previously asserted that this limitation would be within the skill level of the art and would have been an obvious modification. Applicants respectfully traverse such an assertion by the Examiner.

Claim 8 recites that the positioning system further includes an additional linkage having an additional plurality of elongated members and an additional flexure joint with an additional plurality of elongated members coupled to the additional flexure joint to move at substantially the same rate in opposite directions. The Examiner has failed to specifically address these claim limitations.

Claim 11 recites at least one motive device coupled to the holding member. The Examiner has failed to address this specific limitation.

Claim 12 recites at least one motive device coupled to the holding member, wherein each motive device comprises a magnetic linear servomotor. The Examiner has previously asserted that such a limitation is well known. Applicants respectfully traverse such an assertion by the Examiner.

Claim 13 recites that the holding member comprises a wafer chuck, and claim 14 recites that the holding member is configured to hold a semiconductor substrate. The Examiner has previously asserted that such limitations would be inherent with *Scire*. *Scire* does not disclose any information that would leave one skilled in the art to believe that the invention described in *Scire* could be used to hold a wafer chuck or for holding a semiconductor substrate. Instead, references are made to the *Scire* invention being used in a scanning electron microscope (column 2, lines 9-10) or for use in the measurement of surface microtopography (column 6, lines 61-62). In fact, the device in *Scire* clearly does not provide for sufficient x and y movement for use in a semiconductor process.

Claim 16 recites wherein the linkage is configured to minimize kinematic singularities. This claim limitation is not in any way being addressed by the Examiner.

Claim 31 is patentable for reasons similar to those given above. Further, Claim 31 recites a platform coupled to the holding member. The Examiner has not in any way specifically addressed such a claim limitation.

Claim 31 then goes on to recite not only a first set of flexure linkages as recited in Claim 1, but also as second set of flexure linkages. It is then recited in Claim 31 that the first set of flexure linkages facilitates movement of the platform

along a first axis while the second set of flexure linkages facilitates movement of the platform along a second axis. The Examiner has asserted that this is provided in *Scire* in FIG. 2 which provides movement of the holding member 40 of the x and y axes. However, as asserted above with respect to claim 1, *Scire* does not teach or suggest all of these claim limitations within these sets of flexure linkages, and the combination of *Hogan* and *Scire* also does not address all of these claim limitations, for reasons given above with respect to claim 1.

Claim 31 further recites first and second motive devices. For reasons similarly as given above with respect to claim 11, Applicants respectfully assert that these claim limitations have also not been met by the Examiner.

Claim 32 recites that the first pair of elongated members has a first common length and the second pair of elongated members has a second common length. The Examiner has not specifically addressed such claim limitations.

Claim 35 recites that the first and second linkages are each configured to minimize kinematic singularities. This claim limitation has not in any way been addressed by the Examiner.

Claim 38 recites that the first and second pairs of elongated members are subjected to pre-loading. This limitation has not been addressed by the Examiner.

Claim 39 recites that the first pair of elongated members is coupled to the first flexure joint to allow rotation between the first pair of elongated members through at least a 20 degree range of motion. The Examiner has not in any way addressed this claim limitation.

Claim 40 recites that the first pair of elongated members is coupled to the first flexure joint to allow rotation between the first pair of elongated members through at least a 40 degree range of motion. For reasons similarly as given above with respect to claim 6, claim 40 has also not be adequately addressed by the Examiner and Applicants respectfully traverse the Examiner's assertions that such limitations would be well known.

Claim 41 recites that the second pair of elongated members is coupled to the second flexure joint to allow rotation between the second pair of elongated members

through at least a 20 degree range of motion. Again, Applicants respectfully assert that the Examiner has failed to address these claim limitations.

Claim 42 recites that the second pair of elongated members is coupled to the second flexure joint to allow rotation between the second pair of elongated members through a predetermined range of motion. Again, the Examiner has failed to specifically address such claim limitations.

Claims 45 and 46 recite that the first and second motive devices comprise a magnetic linear servomotor. Again, Applicants respectfully traverse the assertion by the Examiner that such limitations would be well known. Likewise, the rejection of Claim 47 is also rejected by Applicants for similar reasons.

Claims 48 and 49 recite that the holding member comprises a wafer chuck or may be configured to hold a semiconductor substrate. For reasons similarly as given above with respect to claims 13 and 14, these claims are also not adequately rejected.

Claim 212 recites a linkage coupled to a holding member defining a first joint thereat with the first joint being coupled to ground through a plurality of elongated members and a flexure joint. For reasons similarly as given above with respect to claim 1, the only way the Examiner has addressed such claim limitations is by combining the teachings of *Hogan* and *Scire*. Again, Applicants respectfully assert that such a combination is not possible, nor does such a combination teach to one skilled in the art such claim limitations. Further, the limitations of the plurality of elongated members being coupled to the flexure joint to move in opposite directions to facilitate movement of the holding member along an axis in response to movement of the holding member by a motive device is also not found by the combination of the references for reasons as given above.

Claim 213 adds limitations to Claim 212 regarding additional linkages and a plurality of elongated members. This is similar to the second set of flexure linkages in claim 31 and is also similar to the limitations of claim 8. For reasons as given above in traversing those claims, Applicants respectfully assert that claim 213 is also patentable over the combination of references.

Claim 216 is patentable for reasons similarly given above that the Examiner has not specifically addressed these claims.

Claim 217 is patentable for reasons similarly given above with respect to claims 39 and 41.

Claim 218 is patentable for similar reasons given above with respect to claim 40.

Claim 219 is patentable for reasons similarly given above with respect to claim 3.

Claim 220 recites that the linkage in claim 216 and claim 213 is configured to constrain the motion of the pair of elongated members to rotate at substantially the same rate away from one another. Applicants respectfully assert that the Examiner has failed to specifically address such claim limitations.

Claim 221 recites that the additional linkage also has such a constraining of motion as given in claim 220, and thus Applicants respectfully assert that claim 221 is patentable for reasons similarly given above with respect to claim 220.

Claim 223 is patentable for reasons similarly given above with respect to claim 12.

Claims 224 and 225 are patentable for reasons similarly given above with respect to claims 13 and 14.

All fees are being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply all charges or credits to Deposit Account No. 06-1050, referencing Attorney Docket No. 21554-027001.

Respectfully submitted,

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CLAIMS APPENDIX

1. An apparatus for positioning of an object in at least one plane comprising:

a holding member configured to hold the object to be positioned; and

a positioning system including a linkage coupled to the holding member, defining a first joint thereat, with said first joint being coupled to a second joint through a plurality of elongated members and a flexure joint, with said plurality of elongated members being coupled to said flexure joint to move at substantially the same rate and in opposite directions to facilitate movement of said holding member along first and second axes, with the first axis extending transversely to the second axis.

2. The apparatus of claim 1 wherein said plurality of elongated members consists of a pair of elongated members.

3. The apparatus of claim 1 wherein each of said plurality of elongated members is subjected to a pre-load.

5. The apparatus of claim 1 wherein said plurality of elongated members consists of a pair of elongated members coupled to said flexure contact joint to allow rotation between said pair of elongated members through a predetermined range of motion.

6. The apparatus of claim 1 wherein said plurality of elongated members consists of a pair of elongated members coupled to said flexure joint to allow rotation between said pair of elongated members through at least a 40 degree range of motion.

8. The apparatus of claim 1 wherein said positioning system further includes an additional linkage having an additional plurality of elongated members and an additional flexure joint with an additional plurality of elongated members coupled to

said additional flexure joint to move at substantially the same rate in opposite directions.

11. The apparatus of claim 1, further comprising at least one motive device coupled to the holding member.

12. The apparatus of claim 1, further comprising at least one motive device coupled to the holding member, wherein each motive device comprises a magnetic linear servomotor.

13. The apparatus of claim 1, wherein the holding member comprises a wafer chuck.

14. The apparatus of claim 1, wherein the holding member is configured to hold a semiconductor substrate.

15. The apparatus of claim 1 wherein each of the elongated members of said plurality of elongated members has a common length.

16. The apparatus of claim 1 wherein said linkage is configured to minimize kinematic singularities.

31. An apparatus for positioning of an object along a first axis and a second axis comprising:

a holding member configured to hold the object to be positioned;

a platform coupled to the holding member;

a first set of flexure linkages coupled to the platform, defining a plurality of first joints thereat, with each of said first joints being coupled to a second joint through a first pair of elongated members and a first flexure joint so as to facilitate movement of said first pair of elongated members in opposing directions while facilitating movement of said platform along a first axis;

a second set of flexure linkages coupled to the platform, said second set of flexure linkages defining a plurality of third joints thereat, with each of said third joints being coupled to a fourth joint through a second pair of elongated members and a second flexure joint so as to facilitate movement of said second pair of elongated members in opposing directions while facilitating movement of said platform along a second axis;

a first motive device coupled to the holding member, wherein the first motive device is configured to move the holding member in relation to the platform along said first axis; and

a second motive device coupled to the platform, wherein the second motive device is configured to move the platform along said second axis.

32. The apparatus of claim 31 wherein said first pair of elongated members has a first common length and said second pair of elongated members has a second common length.

35. The apparatus of claim 31 wherein said first and second linkages are each configured to minimize kinematic singularities.

37. The apparatus of claim 31 wherein said first axis extends transversely to said second axis.

38. The apparatus of claim 31 wherein said first and second pairs of elongated members are subjected to pre-loading.

39. The apparatus of claim 31, wherein said first pair of elongated members is coupled to said first flexure joint to allow rotation between said first pair of elongated members through at least a 20 degree range of motion.

40. The apparatus of claim 31 wherein said first pair of elongated members is coupled to said first flexure joint to allow rotation between said first pair of elongated members through at least a 40 degree range of motion.

41. The apparatus of claim 31 wherein said second pair of elongated members is coupled said second flexure joint to allow rotation between said second pair of elongated members through at least a 20 degree range of motion.

42. The apparatus of claim 31 wherein said second pair of elongated members is coupled to said second flexure joint to allow rotation between said second pair of elongated members through a predetermined range of motion.

45. The apparatus of claim 31, wherein the first motive device comprises a magnetic linear servomotor.

46. The apparatus of claim 31, wherein the second motive device comprises a magnetic linear servomotor.

47. The apparatus of claim 31, wherein the first and second motive devices comprise magnetic linear servomotors.

48. The apparatus of claim 31, wherein the holding member comprises a wafer chuck.

49. The apparatus of claim 31, wherein the holding member is configured to hold a semiconductor substrate.

212. An apparatus for positioning of an object in a plane, said apparatus comprising:

a holding member retaining said object;

a linkage coupled to the holding member, defining a first joint thereat, with said first joint being coupled to ground through a plurality of elongated members and a flexure joint; and

a motive device coupled to the holding member for moving the holding member, with said plurality of elongated members being coupled to said flexure joint to move in opposite directions to facilitate movement of said holding member along an axis in response to movement of said holding member by said motive device .

213. The apparatus of claim 212 further including an additional linkage coupled to the holding member and including an additional plurality of elongated members coupled to an additional flexure joint, with said additional plurality of elongated members coupled to said additional flexure joint to move in opposite directions to facilitate movement of said holding member along an additional axis.

214. The apparatus of claim 212 wherein each of said plurality of elongated members are of a common length.

215. The apparatus of claim 213 wherein said axis extends transversely to said additional axis.

216. The apparatus of claim 213 wherein said plurality of elongated members consists of a pair of elongated members and said additional plurality of elongated members consists of an additional pair of elongated members.

217. The apparatus of claim 216 wherein said linkage is configured to allow rotation between said pair of elongated members through at least a 20 degree range of motion and said additional linkage is configured to allow rotation between said additional pair of elongated members through at least a 20 degree range of motion.

218. The apparatus of claim 216 wherein said linkage is configured to allow rotation between said pair of elongated members through a 40 degree range of motion and said additional linkage is configured to allow rotation between said additional pair of elongated members through at least a 40 degree range of motion.

219. The apparatus of claim 216 wherein said pair of elongated members and said additional pair of elongated members are pre-load.

220. The apparatus of claim 216 wherein said linkage is configured to constrain the motion of said pair of elongated members to rotate at substantially the same rate away from one another.

221. The apparatus of claim 220 wherein said additional linkage is configured to constrain the motion of said additional pair of elongated members to rotate at substantially the same rate away from one another.

223. The apparatus of claim 212 wherein the motive device comprises a magnetic linear servomotor.

224. The apparatus of claim 212 wherein the holding member comprises a wafer chuck.

225. The apparatus of claim 212 wherein the holding member is configured to hold a semiconductor wafer.

EVIDENCE APPENDIX

No evidence was submitted pursuant to §§1.130, 1.131, or 1.132 of 37 C.F.R. or of any other evidence entered by the Examiner and relied upon by Appellants in the Appeal.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings to the current proceeding.

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